

MACHINE MAINTENANCE

Plant Maintenance

- A plant is a place , where men, Materials, Money, equipment, Machinery, etc are brought together for Manufacturing product.

Maintenance:

- In modern industry ,equipment & Machinery are a very important part of the total productive effort that was the case years ago.
- With the development of special purpose and sophisticated machine, equipment and machinery cost a lot more money and therefore their idle or downtime becomes much more expensive.
- So it is vitally important that the plant machinery should be properly maintained.

Objective of plant maintenance-

- a) the objective of plant maintenance is to achieve minimum Breakdown & to keep the plant in good working condition at the lowest possible cost.
- b) machine & other facilities should be kept in such a condition which permit them to be used at their optimum(Profit making) capacity without any interruption or hindrance .
- c) Maintenance division of the factory ensure the availability of the machine , Building & services required by other sections of the factory for the performance of their function at optimum return on investment whether these investment be in material, machinery or personnel.

Importance of maintenance:

- The impertinence of plant maintenance varies with the type of plants and its production.
- Equipment breakdown leads a lot of loss in production.
- ✓ If a piece of equipment without order in a flow of production in factory, the whole line will soon come to a halt. Other production line may also stop unless the initial fault is cleared.
- ✓ This results in an immediate loss of productivity and a demolition of several thousand rupees per hour of output.
- An improper maintenance or neglected plant sooner or later requires expensive and frequent repair, because with the passage of time all machines or other facilities such as transportation facilities, Buildings etc. wear out & need to be maintained to function properly.
- Plant Maintenance plays a prominent role in reduction management because plant breakdown creates problems such as-

Problem Due to plant Breakdown:

- i) Loss in production time
- ii) Re scheduling of production
- iii) Spoilt materials (because sudden stoppage of process damages materials).
- iv) Failure to recover overhead (Because of loss in production Hours).
- v) Need for overtime.
- vi) Need for sub contracting work.
- vii) Temporary work shortages- work required alternative work.

Duties Functions & Responsibilities of Plant Maintenance Department:

- Depending on the size of maintenance department, it has a wide variety of duties to perform by the maintenance department which normally reports to work Manager.
- The different duties, functions and responsibilities of Maintenance Departments are as follows:-
- **INSPECTION**
 - Concerned with Routine Schedule check.
 - Ensure safe & efficient operations
 - Frequency of operation inspections depends on the intensity of the use of the equipments.
 - Inspection section make sure that every working equipments receives proper attention.
 - Items removed during maintenance and overhaul operations are inspected to determine the necessary repair.
 - Maintenance items received from vendors for overhauling or repair are inspected for their fitness.

ENGINEERING

- Engineering department involves to minimize the breakdown plants by alteration & improvements.
- Maintenance Department Undertakes Engineering & supervision of constructional projects that will become part of the plant.
- Engineering & consulting services to production supervisors.

MAINTENANCE:

- ✓ Maintenance of existing plant equipments.
- ✓ Maintenance of existing plant building, & other service facilities such as Yards, Central stores, Roadways, Sewers etc.
- ✓ Engineering and execution of planned maintenance, minor installation of equipment, building & replacement.

REPAIR :

- ✓ Maintenance department **carries** out corrective repair to alleviate (less) unsatisfactory conditions found during preventive maintenance inspection.
- ✓ Such a repair is an unscheduled work obtained of an emergency nature, & is necessary to correct breakdown and it include trouble calls.

Over head :

- ✓ Overhead is a planned, scheduled reconditioning of plant facilities such as machinery etc.
- ✓ Overhaul involves replacement, reconditioning Re assembly etc.

CONSTRUCTION -

- In some organisations, Maintenance department is provided with equipment & personnel & it takes up construction job also.
- Maintenance department handled construction of wood , bricks & steel structure, Cement & asphalt paving electrical installation etc.

SALVAGE (Utilization of scrap) :

- maintenance department may also handle disposition of scrap or surplus materials & involves-
 - ✓ Segregation, reclamation & disposition of production scrap,
 - ✓ The collection and disposition of surplus equipment, materials & supplies

CLERICAL JOBS:

Maintenance department keeps records of cost & also keeps record of time for progress of Job.

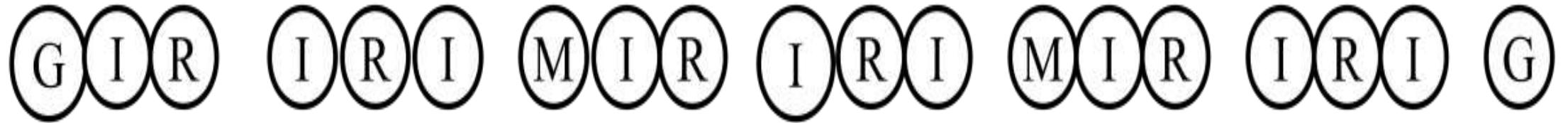
FUNCTION OF OTHERS MAINTENANCE DEPARTMENT

- a. Generation & Distribution of power.
- b. Administration & Supervision of labour force.
- c. Providing plant protection including fire protection.
- d. Establishing & maintaining a suitable store of maintenance materials.
- e. Janitorial services.
- f. Housekeeping-Good housing involves upkeep & cleaning of equipment, building, Toilets, wash-rooms etc.
- g. Pollution & Noise control.

TYPES OF MAINTENANCE:

- Preventive maintenance
- Corrective or breakdown maintenance
- Scheduled or Routine maintenance
- Predictive maintenance
- Non-routine maintenance
- Accident maintenance
- Condition based maintenance
 - ✓ Primary signal
 - ✓ Secondary signal

□ PREVENTIVE MAINTENANCE SYSTEM:



G-General Overhauling	-02
I-Inspection	-09
R-Routine Repair	-06
M-Medium Repair	-02

Preventive maintenance (1951) :

- A system of scheduled, planned to prevent the breakdown of machine or to minimize the problem of breakdown maintenance.
- It is a switch-in-time procedure & its main principle is 'Prevention is better than cure'.
- The key to all good preventive maintenance program is 'Inspection'.
- It locates weak spots in all equipments, provides them regular inspection and minor repairs thereby reducing the danger of unanticipated breakdown.
- Upkeep of plant equipment and machinery to uncover conditions while they are still in a minor stage.
- It is a daily maintenance (cleaning, inspection, oiling and re-tightening), design to retain the healthy condition of equipment and prevent failure through the prevention of deterioration by periodic inspection or equipment condition diagnosis, to measure deterioration.
- It is further divided into **periodic maintenance and predictive maintenance**. Just like human life is extended by preventive medicine, the equipment service life can be prolonged by doing preventive maintenance.

Objectives of Preventive maintenance

- To minimize the possibility of unanticipated production interruption or Major break down by locating or uncovering any condition of M/C.
- To make plant equipment & machinery always available & ready for use.
- To maintain the value of equipment & machinery by periodic Inspections, repairs & Overhaul.
- To maintain optimum productive efficiency of the plant equipment and machinery.
- To maintain the operational accuracy of the plant equipment.
- To reduce the work content of maintenance jobs.
- To achieve maximum production at minimum repair cost.
- To ensure safety of life & limbs of workmen.

Elements of Preventive maintenance

- a) There is no Ready-made on-the self, preventive maintenance programme for any industry.
- b) It must be tailor-made-measured and cut to fit the requirement of individual industry or plant, this is because all industries differ in size, age, location, machinery, resources layout & construction.

Advantages of Preventive Maintenance System :

- Reduced breakdown
- Reduced overtime & lesser odd time-repair
- Greater safety for workers
- Fewer large scale & repetitive repairs
- Low maintenance & repair costs
- Low consumable of spare parts
- Increased life better product quality at low cost
- Better industrial relations because workers don't face lay-off & loss of incentive bonus
- Identification of equipment's requiring high maintenance cost

Corrective or Breakdown maintenance

- It means that people waits until equipment fails and repair it.
- Corrective maintenance implies that repairs are made after the equipment is out of order & it can not perform its normal function any longer.
- Under Such conditions production department calls on the maintenance department to rectify the defect.
- After removing the fault, maintenance engineers do not attend the equipment again until another failure or breakdown occurs.
- This type of maintenance practice is economical for those equipments whose downtime and repair costs are less than with any other type of maintenance.
- This type of maintenance practice involves little administrative work, few records and a comparative small stuff.
- There is no plant interference with production program.

Typical Causes Of Corrective Breakdown

- Failure to replace worn out parts.
- Lack of Lubrication.
- Neglected Cooling System.
- In difference towards minor faults.
- External factors(like low or high line voltage, wrong fuel).
- In difference towards-equipment variation, unusual sound, equipment getting too much heated up etc.

Disadvantages of breakdown maintenance

- Breakdown generally occurs at importunate times. This leads to poor, hurried maintenance & excessive delays in production.
- Reduction in Output.
- Faster Plant Detoriation.
- Increased chances of accident and less safety to both workers and machines.
- More spoilt material.
- Direct loss of profit.
- Breakdown maintenance practice cannot be employed for those plant items which are regulated by statutory provisions.

Periodic maintenance (Time based maintenance – TBM)/Scheduled Maintenance:

- ✓ Time based maintenance consists of periodically inspecting, servicing and cleaning equipment and replacing parts to prevent sudden failure and process problems.
- ✓ It is a stich-in time procedure aimed at avoiding breakdown.
- ✓ This maintenance practice incorporates inspection, lubrication, repair& overhaul of certain equipment which if neglected can result in breakdown.
- ✓ Inspection , Lubrication, Servicing etc. of these equipments are included in the pre determined schedule.
- ✓ Scheduled maintenance practice is generally followed for overhauling of machine, Cleaning of water & Tank etc.

• **Predictive maintenance:**

- ✓ This is a method in which the service life of important part is predicted based on inspection or diagnosis, in order to use the parts to the limit of their service life.
- ✓ Compared to periodic maintenance, predictive maintenance is condition based maintenance.
- ✓ It manages trend values, by measuring and analyzing data about deterioration and employs a surveillance system, designed to monitor conditions through an on-line system.

- **Corrective maintenance (1957):**

- ✓ It improves equipment and its components so that preventive maintenance can be carried out reliably.
- ✓ Equipment with design weakness must be redesigned to improve reliability or improving maintainability.

- **Maintenance prevention (1960):**

- ✓ It indicates the design of a new equipment.
- ✓ Weakness of current machines are sufficiently studied (on site information leading to failure prevention, easier maintenance and prevents of defects, safety and ease of manufacturing) and are incorporated before commissioning a new equipment.

THANK YOU